Appendix B

Re Notice of Proposed Rule Making

ET Docket 18-295 Unlicensed Use of the 6 GHz Band

and

Expanding Flexible Use in Mid-Band Spectrum

Between 3.7 and 24 GHz GN Docket 17-183

Encina Communications Corp.

Discussion Items

- Assurance that unlicensed devices will not cause harmful interference to fixed service incumbents.
- Mitigating the unintentionally severe restriction on the locations of deployment of unlicensed devices resulting from the prohibition on unlicensed devices operating co-channel in exclusion zones.
- Converting exclusion zones into flexible-use "Inclusion Zones" to satisfy the non-interference requirement, as well as to dramatically increase the area where unlicensed devices can safely operate.
- Safe and simple operation of unlicensed APs and Client Devices within buildings and outdoors without complicated AFC protocols.
- Existing Fixed Service operators have the option of upgrading their PtP licensed stations to support Flexible-Use services: licensed and unlicensed fixed, nomadic and mobile.
- Bringing the benefits of Flexible-Use to consumers faster, and dramatically improving industry's return on investment on next generation PtMP backhaul/access, hot spots, Wi-Fi 6 APs, IoTs, 4G LTE/LAA/LWA small cell networks, and 5G small cell mobile networks and products.

FCC and Industry Agree*

Unlicensed Devices

Must Not

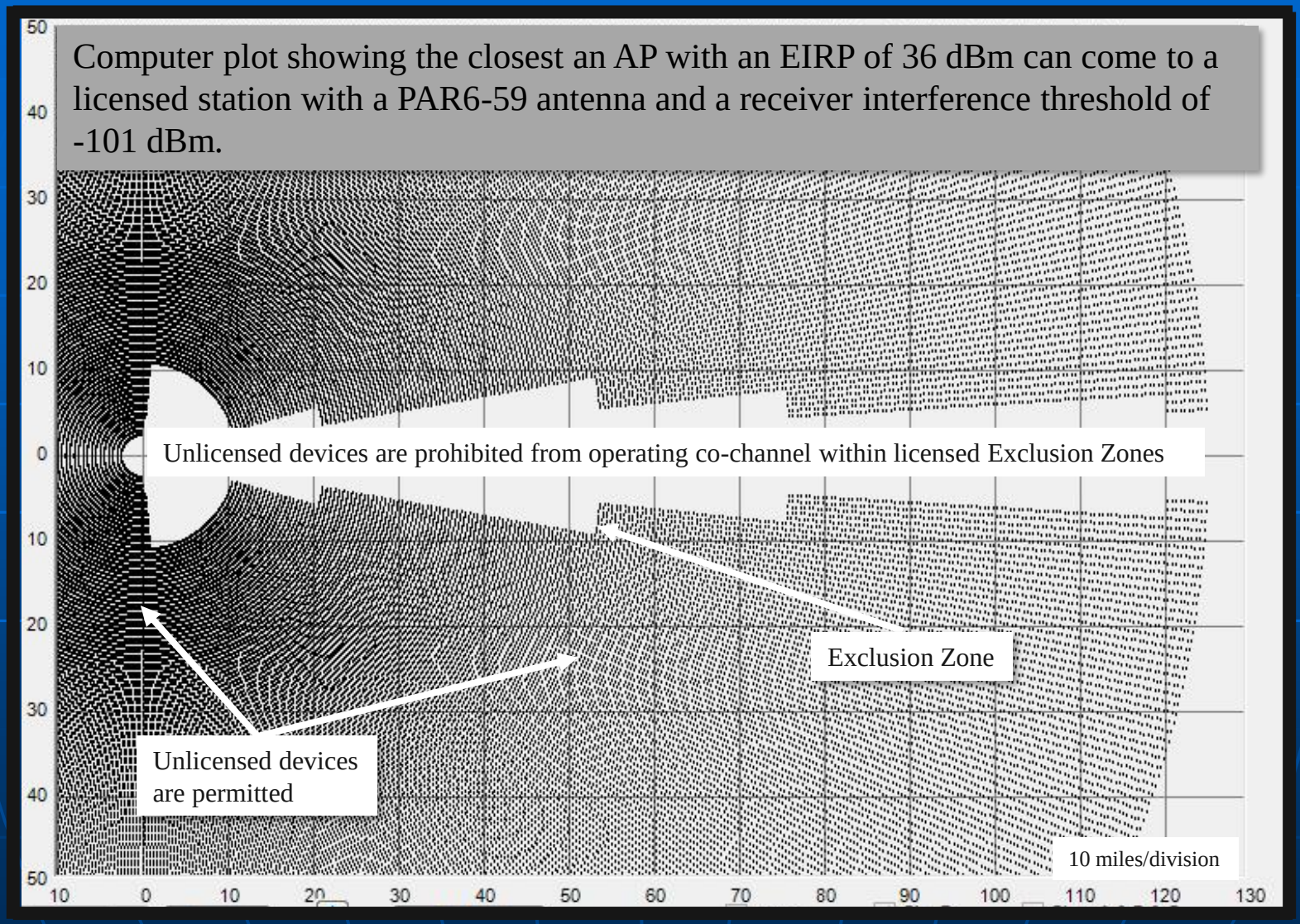
Cause Harmful Interference

to

Licensed Stations

* FCC NPRM ET Docket 18-295 para. 1; Verizon ex parte filing June 8, 2018 GN Docket No. 17-183; Harris, Wiltshire & Grannis, ex parte filing June 2, 2018 para 2; Ericsson ex parte filing January 30, 2018 GN Docket No. 17-183 para 3.

Exclusion Zone – Definition



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Exclusion Zone – Problem

The exclusion zones of three types of commonly used antennas (VHLPX3-6W, PAR6-59, UHX10-59) for a receiver with an interference threshold of -101 dBm (typical for licensed receivers) when subject to interference from an Access Point (AP) with an EIRP of 36 dBm (the maximum allowed under Part 15 of the rules but typical for AP deployments), resulted in the following exclusion zone areas:

VHLPX3-6W = 3,427 sq. miles

PAR6-59 = 1,520 sq. miles

UHX10-59 = 1,282 sq. miles

In Appendix A of the NPRM the number of Common Carrier and Operational Fixed Service call signs in the U-NII-5 and U-NII-7 bands is given as 46,255. Therefore, the combined exclusion zone area is at least 59 million square miles.

Because the US developed land area is only 217,000 square miles*, this means that even if we considered that all existing stations were licensed to only use one of the available channels within the band and that many of the APs had terrain blockage, unlicensed devices would be prohibited from serving a significant portion of consumers nationwide.

*From EPA, USDA Economic Research Service and Western Watershed Project publications.

Exclusion Zone – Solution

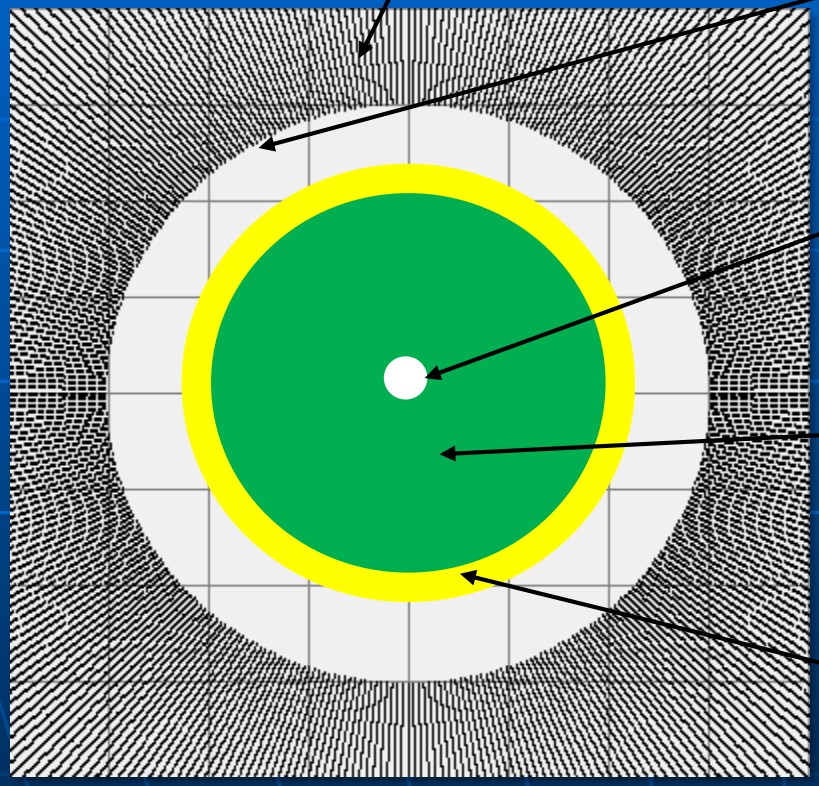
Convert Exclusion Zones into Flexible-Use Inclusion Zones

- An Exclusion Zone becomes a Flexible-Use Inclusion Zone when an existing licensee or new license station applicant agrees to accept the operation of unlicensed devices around their Licensed (Reference) Station (LRS) when the devices are operated within a certain radius from the LRS such that the signal strength arriving at any licensed station from any unlicensed device will be less than the signal from the LRS or less than -101 dBm.

- An LRS can be a station of a public or private network, or both.

Inclusion Zone

Area where New Applicant Licensed Stations can be deployed without causing harmful interference to an LRS



Boundary for New Licensed Station Applicants

The LRS was, pursuant to Rule 101.103, Prior Coordinated with No Interference -- which was confirmed by a Peer Review.

Inclusion Zone around an LRS within which All Permitted Unlicensed Devices (Small Cells, APs, Client Devices, Smart Phones, Laptops, Tablets and IoTs) can be safely deployed

Inclusion Zone around an LRS within which Only Client Devices (Smart Phones, Laptops, Tablets and IoTs) can be safely deployed

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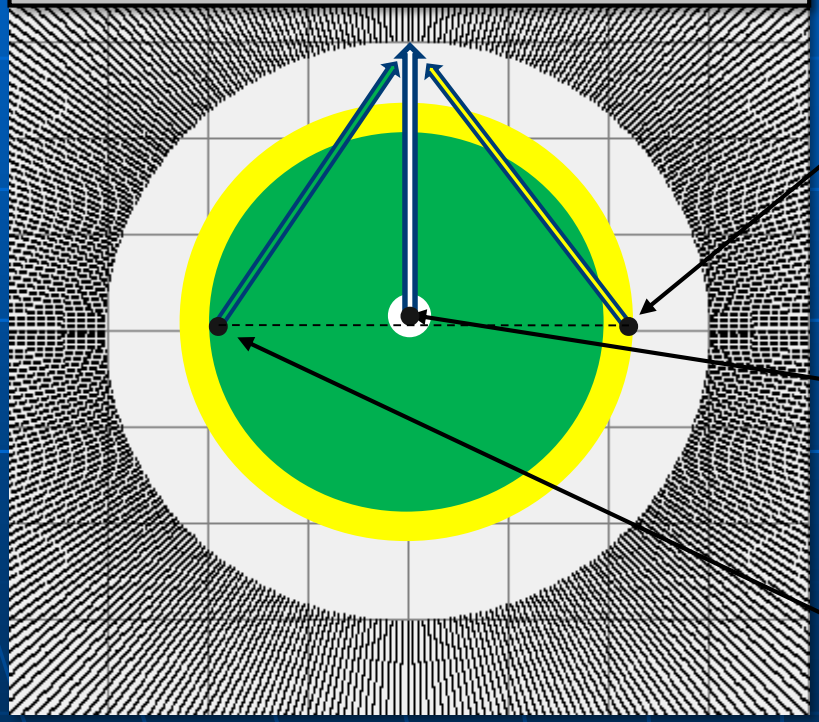
Inclusion Zone (cont'd)

The signal level arriving at any licensed station from an unlicensed device must be less than the signal level from the LRS, or less than the maximum allowed interference level (typically -101 dBm).



The worst (acceptable) case Client interference scenario is when a Client is located at a right angle to an LRS signal and at the boundary of the Client's safe area with LOS to a licensed station and with a maximum EIRP of 24 dBm.

LRS EIRP of 50 dBm.

The worst (acceptable) case AP interference scenario is when an AP is located at a right angle to an LRS signal and at the boundary of the AP's safe area with LOS to a licensed station and with an EIRP of 36 dBm.

Deployment Example

A service provider decides to build a PtMP (hub and spoke) network with the hub being an LRS and with each spoke's Inclusion Zone (sector) supporting licensed/unlicensed networks.

Step 1.

The service provider's spectrum manager successfully prior coordinates the LRS (with N sectors) pursuant to Rule 101.103 – which not only ensures that the LRS will not cause any harmful interference to existing stations, but also defines the Inclusion Zone(s).

The service provider's spectrum manager also defines the service area (within the Inclusion Zone(s)) within which unlicensed devices are permitted to operate – where interference from the unlicensed devices arriving at the input of any other licensees' stations would be less than the interference received from the LRS, or, would be less than the maximum allowed interference level (typically -101 dBm).

Step 2.

The service provider announces that it now supports unlicensed 6 GHz Wi-Fi in a service area (the same as when an operator upgrades from 3G to 4G LTE and advertises the new upgraded service).

Deployment Example (cont'd)

Step 3a. Consumer-Deployed

The consumer goes to the service provider's store (or other electronics outlet), confirms that where they plan to use the AP is within a service provider's 6 GHz service area, and purchases a 6-GHz-capable AP.

When the consumer connects the AP to the Internet, the service provider identifies the MAC address as belonging to one of their subscribers. It then retrieves other data such as the AP's latitude, longitude and elevation, and relays the necessary information to the operator's spectrum manager's computer -- which identifies the nearest supporting LRS and confirms that the AP meets the non-interference criteria. Only then does it allow the AP to transmit on the same frequency and within the channel bandwidth of the LRS. Note: If the AP is disconnected from the Internet then reconnected at a new location, the same initiation protocol would be used.

Step 3b. Operator-Deployed

When a service provider deploys micro cells, femto cells or mobile hot spots, they already know to deploy these devices within the (safe) service area -- where they will not cause harmful interference to other existing licensees.

Inclusion Zone Benefits

- ✓ Unlicensed devices can safely be deployed in the U-NII-5 and U-NII-7 bands in and around every city and town nationwide, instead of only in those few locations where there are subscribers outside of exclusion zones.
- ✓ New Fixed Service applicants are coordinated and licensed under existing rules and protocols (Rule 101.103).
- ✓ APs and Client Devices can safely operate within buildings and outdoors without complicated AFC protocols because they will operate within the safe area boundaries, which were prior coordinated on a LOS basis.
- ✓ Existing Fixed Service operators have the option of upgrading their PtP licensed stations to support Flexible-Use services.
- ✓ Because Inclusion Zones use existing databases, standards and procedures -- requiring only minor rule changes and simple software changes -- it is possible to begin unlicensed operation in the U-NII-5 and U-NII-7 bands far sooner than the operation of unlicensed devices outside of Exclusion Zones, thereby bringing the benefits of Flexible Use to consumers faster, and dramatically improving industry's return on investment on next generation PtMP backhaul/access, hot spots, Wi-Fi 6 APs, IoTs, 4G LTE/LAA/LWA small cell networks, and 5G small cell mobile networks and products.

Conclusion

The benefits of operating unlicensed devices within Inclusion Zones using the methodology described are numerous and substantial and most importantly, can be realized immediately and safely.